

Undergraduate Research & Creative Activities (URECA)

<http://stonybrook.edu/ureca>

Kerri Keng

WISE student, Class of 08,
Majors: Biomedical Engineering, Applied Mathematics & Statistics;
Minor: Mechanical Engineering;
URECA & MARC Undergraduate Research Programs

Research Mentor: Dr. Stefan Judex,
Department of Biomedical Engineering

Researcher of the Month - February 2008

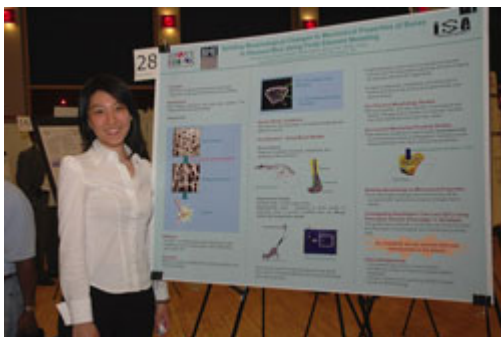
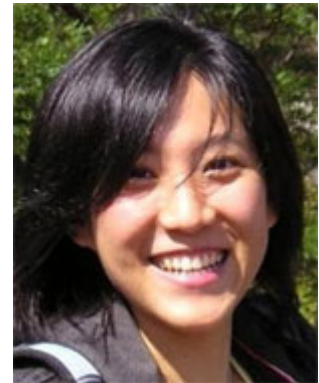
About Kerri

Taking on challenges seems to be bred in the bone for Yenmei (Kerri) Keng. When Kerri moved to the US from Taiwan 6 years ago, her main focus was learning English and adapting to new surroundings. She is now about to graduate with a 3.94 GPA and a double major in [Biomedical Engineering](#), and [Applied Mathematics & Statistics](#), and a minor in [Mechanical Engineering](#). Working in the lab of Professor [Stefan Judex](#), Kerri's research on "Biomechanics - Bone Loss investigations from morphological and mechanical properties perspectives," has been supported with fellowships from [URECA](#) and from the [MARC](#) Programs, and has already earned her name on a publication in *Bone*

[M. Squire, A. Brazin, Y. Keng, S. Judex, *Baseline bone morphometry and cellular activity modulate the degree of bone loss in the appendicular skeleton during disuse.*].

Kerri has presented at Annual [Biomedical Engineering Society](#) meetings (in Baltimore-2005, Los Angeles-2007), the [Annual Biomedical Research Conference for Minority Students](#) (Anaheim, 2006); as

well as [AGEP's regional Gathering of Science Scholars](#) (2006) held on campus. Kerri also received a DAAD [Research Internship in Science & Engineering](#) (RISE) to do biotechnological engineering research on wastewater treatment at the [Fraunhofer Institute of Interfacial Engineering & Biotechnology \(IBG\)](#) in Stuttgart, Germany (Summer 2006), and has received numerous scholarships and awards (Citigroup; Computer Science, Engineering & Mathematics; etc.). She is a member of the campus [Biomedical Engineering Society](#), the [Math Club](#), the [Society of Women Engineers](#), as well as Tau Beta Pi, Alpha Tau Honors Society, and [Golden Key](#); and is active in the Taiwanese Student Association (President in 2005). She plans to begin graduate study in biomechanics/bioengineering next fall.



She will be presenting for the 3rd time at the annual [URECA Celebration](#); be sure to check out her poster and discover what "[Your Friend the Rat](#)" can tell you about bone loss in space! Below are some excerpts of her interview with Karen Kernan, [URECA](#) Director.

The Interview

Karen: Tell me about your primary research area. What do you work on?

Kerri: I joined Dr. Stefan Judex's lab in my freshman year. So I've been working on bone loss and biomechanics-oriented research for 3 complete years now. In my freshman year, I focused more on the morphology perspective--the shape/appearance of the bone. Then in my sophomore year, I switched to genetic studies of bone loss. In my junior/senior years, I switched back to mechanical/physical properties of bones, using mice that are suspended by their tails—to investigate conditions kind of similar to outer space when there is no mechanical loading on bones. Dr. Judex has a relatively big lab. We have a lot of bulk samples to analyze and a lot of scanings to do. And we have a good amount of undergraduates, three right now. In the summer, we had two high school students too. I like being around the graduate students ...but it's actually good to see undergrads around the lab. I feel very comfortable working there.



And you also are hard at work on a senior design project?

Yes, there are four of us, working with Dr. Yingtian Pan in the BME department and with Dr. Andrew Gouldstone. Our project involves rabbit bladders—using an imaging system to observe how bladders react under different drug treatments. Our group is responsible for designing a stretcher that holds the bladder; we need to keep the temperature constant . . . Our advisor Dr. Pan wasn't looking for mechanical testing function from our device but we decided that we want to take this challenge and measure what kind of force the bladder exerts when it's being stimulated electrically. We spent the whole semester figuring out how to measure the tiny mechanical or tiny force that the bladder has when it's contracted. So we actually designed something on paper and we're going to start building it next semester.

You've had the opportunity to work with some great mentors!

This summer, I may also do some work with Prof. Andrew Gouldstone after I come back from visiting Taiwan. There's a modeling project that I wanted to work on, but never had time before. And yes, I've really benefited from having such supportive mentors. I want to be helpful to other students too . . .

How did you first get involved in the Judex lab?

I took BME 100. That's the introduction to biomedical engineering. Different faculty members from the department come into the class to speak to students about their research. For one of the lectures, Dr. Stefan Judex came in and he talked about biostatistics and about his research. I was really fascinated by the fact that astronauts lose their bone 6 months after they come back from their mission . . . So I decided to approach him and ask if there was any opening in his lab for me to join and to learn something.

Did you know a lot about research when you started?

The first time I went to the lab there was a graduate student who was guiding me and she was telling me exactly what to do. And I did not even know what the ultimate goal of the project was. I just listened and she told me to draw this circle around the bone here and do it slice by slice. I did not think about why I was doing it. Four months later, I wanted to submit an abstract to BMES 2005 conference. I started asking her why I was doing it, and how do I write an abstract, things like that. Writing abstracts was really helpful for me to start thinking about why I was doing the things I was asked to do. That was my first year of research.

Later on, I became more and more independent. Now I have a project that's pretty much my project. I still have a graduate student mentor, but I know where I'm going, I know what my ultimate goal is. I go to ask questions only when I have big problems. Little problems I try to solve or figure out for myself but I've learned not to ask every little thing. I learned how to be more like a graduate student as an undergraduate.

Has being in the lab influenced your professional goals?

I've actually just recently finished with grad school applications. And yes, doing research has helped me realize that I wanted to focus on biomechanics for graduate school. Sometimes when I take classes, I get confused about whether I really like the subject or not. I can get interested in a lot of different topics. But when I do research, and I'm reading different publications, papers, and actually working on the subject, I really know if I like the stuff or not.

Also, when I'm around the lab and with the graduate students. . . I see what it's like for them. I see them work. I see them being frustrated sometimes too! They are always busy, and always here in the lab. So I can kind of imagine myself in the future, knowing what graduate study involves.

So you're feel ready, prepared for what's ahead?

Certainly! Also BME has helped me prepare. I enjoy being in the BME major because I like learning from different fields. It's very broad, interdisciplinary. We learn from mechanical engineering, electrical engineering. If you want to go to graduate school, it's a very good program. It helps you figure out what you want to do in the future. It helped me figure out that among the different tracks that we have, I really enjoyed doing mechanical kind of stuff more than doing molecular or electrical work.

Can you tell me about the WISE Program?

It's a big support not only financially but also mentally. There are still relatively few women in mechanical engineering, my minor. . . WISE provides more inspiration. Since day one, I got to know people who are similar to me and who are doing similar things as me--people who also like engineering.

I'm also in the BME Society. We are all friends and we are all in the same classes. We go there to have pizza and listen to guest speakers together. For me, it's really more of a socializing activity.

What's it like being in the MARC program?

I joined MARC in 2006. It's a great program because it takes people from different majors and we have monthly meetings where we meet with each other and two fellows present at each meeting. And we can learn from each other. I've been learning from chemistry majors, mechanical engineers....a variety of fields. It's not just BME people or biochemistry people there.

What has been your favorite/least favorite research experience?

Best was when I presented. Worst was when I had to study for exams and when I didn't know what to do for research. The 2007 BMES-in Los Angeles-was the best conference. I went with people. I think I was more confident. I gave an oral presentation rather than just a poster.



I know you've been to several national conferences and had various experiences. But generally speaking what do you get out of going to meetings?

It's helpful to know what other undergraduate students are doing outside of Stony Brook. Sometimes...if I go to URECA or to conferences like BMES, or ABRCMS that I went to in 2006, I feel more inspired and I wanted to do more. I like the feeling of achieving something and telling people what I have done about research.

Is doing poster design a skill, or an art, that you've learned over the years?

I've learned what's important to be there and what's not. Certainly make the title understandable; and just put the points in that you think your audience will understand. Depending on the conference, you have a different audience. BMES is more professional than the audience at URECA. If you go to a bone conference, you can put more terminology there because you don't want it to be too general. You want to show the details that you're working on. The URECA presentations are more for a general audience. URECA is more of a socializing event for me. Friends come and look at my poster, and I tell them what osteoporosis is, and explain the big picture about my research. They don't really want to know the details because they don't really understand it.

Is it difficult to balance academics and lab work?

Actually not, because I see it as a class. For MARC, I m required to register for 3 credits for research. 1 credit is equivalent to 3 hours per week. So I am required to be in the lab for at least 9 hours a week. So when I do my scheduling before each semester, I put in the time for research right into the schedule. I study on weekends and I try to set time slots for research every week. This past semester, I had mornings from Monday to Friday for doing research; all my classes were in the afternoon. Doing research is just part of the schedule. Still I don't have have much time to do other activities. Weekdays, it's classes and research. Weekends, it's homework and study. Music composition, for example, is something I can only do now when I walk to classes. I compose music in my head. I don't have time to write it down or edit.

If you were talking to other students, what advice would you give regarding research?

You just need to take the initiative to start doing something—to approach faculty or to start talking to upperclassmen.

How did you find out about RISE, URECA and other opportunities?

I read all the emails. For the RISE program, the program in Germany, I knew about it because Dr. Clint Rubin emailed all the BME students about it. I read that email. For the MARC program, I learned about it from emails too. Emailing is actually the best way to learn about opportunities. Also, I check the posters around campus. And then I just apply for things.

I know you've spent of your summer research has been funded by URECA. But you also had a summer research experience overseas, didn't you?

The summer after sophomore year, I went to Germany through the RISE program, a program for college students from North America and Canada. When you apply, you rank the top three research areas that you want to work on. The project that I worked on was actually the 3rd project that I ranked-- on wastewater treatment. I worked mostly on computer programming to monitor and control bioreactors ...There was a computer program, Matlab, that I had to learn on my own. Then they gave me another project, to optimize and to stimulate the bioreactor conditions for the bioreactors that they use to treat wastewater. In Germany, it took me awhile to figure out the math first, and then I needed to figure out the computer language. But I learned something from it. At first, I felt isolated because everybody spoke German and I did not. But they were really nice to me. I got to know some friends at the dorm where I lived; And summer 2006 was actually when the World Cup was going on so that was exciting there!

Was science a strong emphasis in your early education? Did you always know you wanted to go into engineering?

I moved from Taiwan when I was 16. I went to high school for 2 years here, and during that time I was just learning English and didn't really think about what I wanted to for college much. In my AP chemistry class, the teacher told me there's something called biomedical engineering I might want to try. When I decided to do BME and came to Stony Brook and heard Stefan Judex' talk in that BME 100 class, I just wanted to learn more about bone research.

As far as my earlier years, Taiwan has a very strict educational system. We were trained to memorize formulas and apply numbers—to try to beat each other out to be the most successful student in school. Everything was based on your grades. Not like here. Research wasn't a big thing. Extracurricular was less important too. It was hard after I moved. I had to teach myself to think for myself, not to just listen to teachers. Not to just follow rules. So I think I learned a lot during the past 4-5 years. It's a complete different educational system here.

What is it that you like about biomechanics?

I don't like memorizing things. So biology is not my favorite . . . For most of the bio classes I've taken at Stony Brook, I had to just memorize the slides and I could ace the class. For mechanical engineering, you can memorize all the formulae and you can memorize the textbook, but it doesn't mean you know what you're learning.

So is that what appeals to you then, about engineering?

Yes, it's more of understanding things, understanding logical things. For example if there is a force loading on a bridge, you need to consider the supporting forces. There are different factors that contribute to mechanical engineering problems...You need to know when to use which formula, and sometimes how to derive different formulas...I like math. That's why I decided to do AMS as my second major. And I think they all come together, math, mechanical engineering, BME...they're all more logical thinking-oriented than just memorization. I really enjoy being in this environment; I like engineering.